U.S. DEPARTMENT OF COMMERCE
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WATER QUALITY SURVEY JAMES RIVER AND SELECTED TRIBUTARIES

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
CHARLOTTESVILLE, VIRGINIA

OCTOBER 1969

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U.S. DEPARTMENT OF THE INTERIOR
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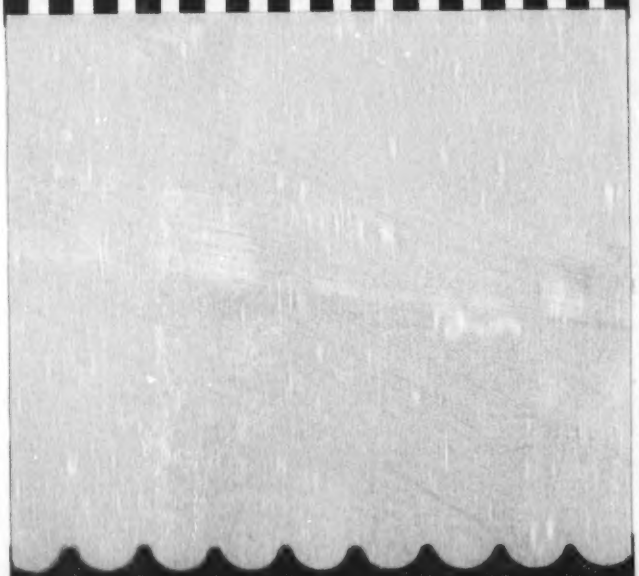
MIDDLE ATLANTIC REGION



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The results of a survey of the James River and selected tributaries to obtain information for evaluating any degradation from a proposed sewage discharge from Richmond, Virginia, and to verify a mathematical model of the estuary are presented.

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17b. Identifiers/Open-Ended Terms

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WATER QUALITY SURVEY

JAMES RIVER

AND SELECTED TRIBUTARIES

OCTOBER 1969

DATA REPORT NO. 1

Federal Water Pollution Control Administration
Middle Atlantic Region
918 Emmet Street
Charlottesville, Virginia 22901

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DATA REPORT

I. PURPOSE

In September 1969, the City of Richmond announced a proposal to discharge approximately 30 mgd of raw sewage to the James River for 110 days while connecting a new grit chamber to the sewage treatment plant. During October, the Federal Water Pollution Control Administration, Middle Atlantic Region conducted an intensive water quality survey of the James River and selected tributaries to obtain information for evaluating any degradation from the raw sewage discharge and to verify a math model of the estuary.

II. SCOPE

Seventeen stations on the James River, five on the Appomattox River, and one each on Falling Creek, Gillies Creek, Goode Creek, and Almond Creek were sampled at either slack low or high tide from October 14 through October 30, for the following parameters: temperature, D.O., BOD, COD, total and fecal coliforms, nutrients, total organic carbon (TOC), heavy metals, phytoplankton, volatile solids on bottom muds and bottom fauna.

III. PROCEDURES

All sampling and analyses were performed in accordance with either Standard Methods for the Examination of Water and Wastewater or FWPCA Methods for Chemical Analysis of Water and Wastes.

IV. STATION DESCRIPTION

1969

JAMES RIVER SURVEY

STATION NUMBER	STREAM NAME	STREAM MILE	LOCATION
-	James River	107.00	Boulevard Bridge
200	James River	104.18	I-95 Bridge
175	James River	102.78	Midstream 300 yards south of Richmond STP outfall
168	James River	101.26	Navigation light No. 168 950 yards south of Goode Creek
166	James River	98.02	Navigation light No. 166 650 yards south of Deepwater terminal
162	James River	95.78	Navigation Buoy No. 162 500 yards east of Drewrys Bluff
157	James River	93.00	Navigation light No. 157 south of Kingsland Creek
155	James River	91.89	Navigation light No. 155 200 yards south of Proctor Creek
150	James River	88.50	Navigation light No. 150 1000 yards east of Dutch Gap
135	James River	80.10	Navigation light No. 135 1500 yards west of Turkey Island Cutoff
126	James River	72.60	Navigation Buoy No. 126 100 yards east of Bermuda Hundred
106	James River	67.32	Navigation Buoy No. 106 500 yards east of Jordan Point Bridge
94	James River	63.26	Navigation Buoy No. 94 200 yards north of Maycocks Point
86	James River	60.25	Navigation Buoy No. 86 600 yards north of Windmill Point
76	James River	55.48	Navigation Buoy No. 76 2100 yards east of Weyanoke Point

1969

JAMES RIVER SURVEY

STATION NUMBER	STREAM NAME	STREAM MILE	LOCATION
-	James River	51.85	200 yards south of Sturgeon Point navigation light
74	James River	48.32	Navigation Buoy No. 74 600 yards northeast of Brandon Point
800	Appomattox River	11.41	U. S. Route 1 Bridge in Petersburg
700	Appomattox River	9.64	Southern Materials conveyor belt
600	Appomattox River	5.75	Confluence of Swift & Appomattox Rivers
500	Appomattox River	2.50	Point of Rocks Power Cable
400	Appomattox River	0.44	Route 10 Bridge
-	Goode Creek	0.00	Midstream at Mouth
-	Almond Creek	0.1	Midstream 200 yards upstream from mouth
-	Gillies Creek	0.05	Midstream 100 yards upstream from mouth
-	Falling Creek	0.1	Midstream 200 yards upstream from mouth

V. SURVEY RESULTS

1969

JAMES RIVER SURVEY

DATE	TIME	DEPTH OF SAMPLE FEET	TEMP °C	DO mg/l	DO % Sat	BOD2 mg/l	BOD5 mg/l	TOC mg/l	pH
				Boulevard Bridge					
10-16	1200	3	18	9.6	101	0.63	1.1	3.6	7.3
18	0845	3	23	9.4	108	1.2	1.99	8.5	7.4
20	1025	3	15	10.4	102	1.1	1.63	4.2	7.9
				Station 200					
10-14	1400	1	21	9.2	102	-	-	-	-
15	1450	5	17	9.9	102	0.8	1.5	5.4	8.0
16	1505	5	20	9.8	106	1.0	1.5	3.9	7.7
17	1627	1	19	9.9	105	1.6	2.9	7.4	8.7
18	0650	1	15	9.4	92	1.4	2.33	5.7	7.3
19	1207	6	16	10.1	101	1.1	1.87	2.2	7.7
20	0810	3	16	9.2	92	1.2	2.23	3.9	7.7
21	0920	3	16	9.1	91	2.1	3.54	5.1	7.8
22	0945	3	17	9.2	95	1.39	2.61	3.8	7.7
23	1050	3	15	10.3	101	0.69	1.40	4.2	7.8
24	1120	3	11	10.9	98	1.1	2.3	3.4	7.9
30	1325	3	12	11.6	107	1.6	2.6	5.3	8.1
				Station 175					
10-14	1345	10	21	8.1	90	-	-	-	-
15	1442	10	18	8.9	94	2.5	4.0	5.8	7.6
16	1450	10	20	9.0	98	5.9	+8.6	9.4	7.4
17	1615	10	18	9.2	97	7.7	13.8	13.0	8.0
18	0630	10	16	8.9	89	1.9	3.55	7.0	7.3
19	1150	10	17	9.2	95	0.8	1.86	4.4	7.6
20	0757	10	16	9.0	90	1.5	2.91	3.8	7.6
21	0910	10	17	8.5	88	0.89	2.15	3.7	7.7
22	0925	10	17	8.5	88	1.47	4.16	3.9	7.7
23	1035	10	15	9.1	88	1.40	2.87	13.4	7.6
24	1110	10	12	9.8	91	1.6	3.1	5.0	7.6
30	1315	10	13	10.4	98	4.2	8.4	6.1	7.6

1969
JAMES RIVER SURVEY

DATE	TIME	DEPTH OF SAMPLE FEET	TEMP °C	DO mg/l	DO % Sat	BOD2 mg/l	BOD5 mg/l	TOC mg/l	pH
				Station 168					
10-14	1324	15	21	7.1	79	-	-	-	-
15	1430	15	19	7.8	83	2.9	4.6	5.3	7.8
16	1435	10	19	8.3	88	1.8	3.6	4.5	7.3
17	1557	10	18	8.1	85	4.1	8.3	9.8	7.9
18	0545	10	16	8.5	85	5.2	10.5	7.1	7.3
19	1135	10	18	8.6	90	3.8	5.41	3.2	7.6
20	0750	10	16	9.0	90	3.7	5.1	5.1	7.5
21	0845	10	18	8.3	87	4.5	6.23	4.0	7.8
22	0910	10	18	7.8	82	6.7	11.2	5.1	7.6
23	1020	10	16	8.4	84	7.5	18.1	5.8	7.6
24	1050	10	13	9.2	87	4.2	6.8	3.8	7.7
30	1300	10	13	10.1	95	5.5	9.5	9.4	7.5
				Station 166					
10-14	1308	15	20	5.4	59	-	-	-	-
15	1415	15	19	4.6	49	2.4	3.7	6.8	7.6
16	1423	15	19	5.5	59	2.8	4.2	4.8	7.1
17	1547	15	18	6.0	63	3.9	6.5	7.7	7.7
18	0520	15	16	5.7	57	2.8	4.22	6.8	7.1
19	1125	15	18	4.9	52	2.8	4.12	3.3	7.3
20	0740	15	16	6.4	64	2.0	3.27	4.0	7.4
21	0825	15	17	6.9	71	2.25	3.25	4.6	7.4
22	0855	15	17	5.2	54	2.63	3.81	4.9	7.3
23	1010	15	16	4.7	47	3.25	4.98	5.6	7.3
24	1035	15	15	6.0	59	3.2	4.7	5.3	7.4
30	1247	15	14	7.0	67	4.0	7.4	4.2	7.3
				Station 162					
10-14	1250	15	21	5.7	63	-	-	-	-
15	1348	15	20	3.6	39	2.1	3.3	6.8	7.6
16	1405	15	21	2.7	30	3.0	4.4	5.3	7.0
17	1525	15	19	3.5	37	2.2	3.7	9.8	7.4
18	0450	15	16	4.2	42	1.8	3.08	5.9	7.0
19	1108	15	18	3.0	32	1.4	2.69	3.0	7.2
20	0725	15	17	4.0	41	2.1	3.34	4.1	7.2
21	0808	15	17	5.0	51	2.0	3.2	4.7	7.2
22	0840	15	17	4.4	45	1.54	2.81	4.2	7.2
23	0955	15	15	3.1	30	1.63	2.93	4.2	7.1
24	1020	15	15	3.1	30	2.8	4.2	5.0	7.2
30	1232	15	15	5.2	51	3.7	5.1	6.2	7.1

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JAMES RIVER SURVEY

DATE	TIME	DEPTH OF SAMPLE FEET	TEMP °C	DO mg/l	DO % Sat	BOD2 mg/l	BOD5 mg/l	TOC mg/l	pH
				Station 157					
10-14	1222	15	21	1.0	11	-	-	-	-
15	1317	15	19	4.1	44	1.6	2.8	6.7	7.6
16	1450	15	20	3.3	36	1.9	3.2	5.9	7.0
17	1530	15	20	2.6	28	1.4	2.6	8.7	7.5
18	0405	15	18	2.8	29	1.2	2.4	7.0	7.0
19	1055	15	18	2.8	29	1.2	2.33	3.2	7.2
20	0710	15	18	2.3	24	1.3	2.30	4.0	7.2
21	0748	15	18	2.7	28	1.22	2.32	3.7	7.1
22	0830	15	17	3.6	37	1.57	2.51	5.7	7.2
23	0940	15	15	3.6	35	2.32	3.68	4.2	7.0
24	1008	15	16	2.4	24	1.8	3.0	4.2	7.1
30	1220	15	14	4.5	43	2.6	4.1	5.0	7.1
				Station 155					
10-14	1355	10	22	0.2	2.3	1.1	1.9	-	-
18	0525	15	19	2.5	27	1.1	2.13	6.2	7.0
19	1122	10	20	3.1	34	1.4	2.4	6.3	7.2
20	0635	15	18	2.6	27	1.5	2.4	3.7	7.3
21	0741	15	19	2.4	25	1.3	2.49	4.2	7.1
22	0855	10	18	2.7	28	1.39	1.75	4.3	7.1
23	0931	15	17	3.5	36	1.44	2.55	3.5	7.0
24	1020	15	16	3.0	30	1.1	2.3	3.7	7.1
30	1215	15	15	3.7	36	2.4	3.6	4.8	6.9
				Station 150					
10-14	1345	10	23	1.7	20	-	-	-	-
15	1330	10	21	2.2	25	1.8	3.2	5.3	7.3
16	1430	15	21	3.5	39	1.4	2.6	5.0	7.1
17	1517	15	21	3.6	40	1.5	2.9	10.0	7.5
18	0435	15	20	3.8	41	0.9	2.1	6.4	7.0
19	1112	10	19	4.1	44	1.5	3.16	5.5	7.2
20	0622	15	20	3.4	37	1.6	2.76	3.0	7.3
21	0730	15	21	3.4	38	1.42	2.48	3.7	7.1
22	0835	10	19	3.2	34	1.32	3.32	3.6	7.1
23	0918	15	18	3.8	40	1.33	2.75	4.2	7.1
24	1006	15	17	4.3	44	1.2	2.5	3.7	7.1

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DATE	TIME	DEPTH OF SAMPLE FEET	TEMP °C	DO mg/l	DO % Sat	BOD2 mg/l	BOD5 mg/l	TOC mg/l	pH
				Station 135					
10-14	1320	10	22	3.6	41	-	-	-	
15	1305	5	21	3.8	42	1.8	4.1	6.4	7.3
16	1400	15	20	3.8	41	1.6	3.8	5.6	7.1
17	1450	15	20	4.0	53	2.5	5.3	7.1	7.5
18	0415	15	19	4.5	48	1.1	3.52	7.2	7.1
19	1054	10	19	5.5	58	2.3	4.91	6.5	7.1
20	0605	15	19	4.4	47	1.8	4.55	3.2	7.1
21	0712	15	20	4.4	48	1.71	4.0	3.6	7.1
22	0805	10	19	4.8	51	1.55	3.96	5.2	7.2
23	0855	15	18	5.5	58	1.93	4.83	4.4	7.2
24	0950	15	16	5.6	56	1.9	4.5	3.5	7.1
				Station 126					
10-14	1308	10	22	4.3	49	-	-	-	-
15	1250	5	21	4.7	52	3.2	6.3	10.5	7.3
16	1340	15	20	5.3	58	4.5	7.2	7.8	7.1
17	1443	15	20	4.5	49	1.9	4.7	6.9	7.5
18	0355	15	19	4.9	52	1.3	3.85	9.6	6.9
19	1046	10	19	5.6	60	2.0	4.37	6.5	7.0
20	0545	15	18	5.6	59	2.0	4.48	3.7	7.3
21	0701	15	20	5.3	58	1.96	4.59	4.3	7.1
22	0757	10	18	5.3	56	1.82	4.17	5.6	7.2
23	0843	15	17	6.2	64	2.02	4.87	5.8	7.2
24	0940	15	16	6.2	62	1.9	4.7	4.3	7.1
				Station 106					
10-27	1125	15	15	6.14	60	2.39	5.87	11.0	7.3
28	1130	15	14.5	6.21	60	2.82	6.45	5.5	7.5
29	1210	15	13	7.07	67	2.85	6.65	7.9	7.5
30	1205	15	13	7.53	71	2.69	6.31	6.4	7.6
				Station 94					
10-27	1110	15	15	6.11	60	2.69	5.57	5.6	7.5
28	1115	15	15	6.52	64	2.25	4.49	7.6	7.6
29	1200	15	12.5	7.59	71	2.03	4.39	5.6	7.5
30	1140	15	13	7.27	69	2.19	4.78	7.5	7.5

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DATE	TIME	DEPTH OF SAMPLE FEET	TEMP °C	DO mg/l	DO % Sat	BOD2 mg/l	BOD5 mg/l	TOC mg/l	pH
				Station 86					
10-27	1100	15	15	6.92	68	1.57	3.56	5.0	7.4
28	1100	15	14	7.01	67	1.30	2.69	9.3	7.5
29	1145	15	13	7.63	72	1.27	3.03	5.2	8.0
30	1120	15	13	7.75	73	1.41	3.04	5.9	7.6
				Station 76					
10-27	1040	15	15.5	6.99	70	.83	1.94	5.0	7.4
28	1030	15	14.5	7.12	69	.79	1.76	4.6	7.5
29	1130	15	13.5	7.57	72	.54	1.35	4.8	7.4
30	1050	15	14	7.60	73	.86	1.56	5.3	7.5
				Sturgeon Point					
10-27	1020	15	16	6.51	65	.54	1.31	5.3	7.2
28	1010	15	14.5	6.80	66	.66	1.31	3.4	7.4
29	1115	15	13.5	7.20	69	.65	1.48	7.9	7.3
30	1035	15	13	7.36	69	.65	1.11	4.5	7.6
				Station 74					
10-27	1000	15	16	6.75	68	.83	1.58	4.8	7.3
28	0945	15	14	7.40	71	1.79	2.55	4.3	7.5
29	1100	15	15	7.61	75	.71	1.29	4.5	7.3
30	1020	15	13	7.79	73	.68	1.25	5.7	7.5
				Gillie Creek					
10-20	0905	-	17	2.4	25	6.7	10.3	5.9	7.0
				Almond Creek					
10-19	1142	5	17	8.3	86	1.2	4.85	3.6	8.8
				Goode Creek					
10-18	0700	2	16	7.6	76	21.2	42.3	8.7	7.0
19	1030	1	14	0.0	0	86.0	227.0	5.2	6.6

1969
JAMES RIVER SURVEY

DATE	TIME	DEPTH OF SAMPLE FEET	TEMP °C	DO mg/l	DO % Sat	BOD2 mg/l	BOD5 mg/l	TOC mg/l	pH
				Falling Creek					
10-15	1420	3	19	4.2	45	2.94	3.85	5.3	7.6
16	1412	1	19	4.5	48	+8.3	+8.3	13.0	6.9
17	1535	1	18	5.8	61	+7.9	+7.9	23.8	7.4
21	1055	1	17	4.9	51	3.55	7.65	8.2	7.2
22	1025	1	17	5.4	56	11.4	22.5	13.5	7.1
24	1255	3	14	2.9	28	5.8	10.1	10.8	7.3
				Station 800					
10-27	1140	6	16	9.9	99	1.59	2.54	5.8	7.3
28	1135	6	15	9.8	96	0.37	2.02	5.0	7.6
				Station 700					
10-27	1115	6	15.5	8.9	88	2.05	3.25	4.4	7.3
28	1120	6	15.5	8.4	83	4.38	6.02	5.0	7.4
				Station 600					
10-27	1015	8	13.5	8.1	77	3.19	5.88	8.7	7.0
28	1045	8	13	8.4	79	3.12	5.57	9.1	7.3
				Station 500					
10-27	0930	20	13.5	8.8	84	2.94	5.68	20.6	7.0
28	1035	20	13	8.6	81	3.38	6.25	7.9	7.3
				Station 400					
10-27	0900	20	14.5	8.4	82	2.62	5.24	5.9	7.0
28	1025	20	14	7.8	75	3.17	6.01	5.8	7.2

1969

JAMES RIVER SURVEY

VARIATION OF DO & BOD DURING ½ TIDAL CYCLE

DATE	TIME OF LOW WATER SLACK	TIME OF SAMPLE	TEMP °C	DO mg/l	BOD_2 mg/l	BOD_5 mg/l
		Station 175				
10-23	1019	1125	15	9.1	1.81	3.67
		1215	14	9.2	2.61	3.17
		1315	14	9.1	2.73	7.55
		1405	13	9.0	4.84	9.09
		1455	14	9.0	6.39	8.80
		Station 175				
10-19	1901	1255	18	9.1	0.9	3.66
		1400	17	9.2	2.5	4.98
		1500	17	9.7	2.4	4.43
		1600	17	9.6	3.4	5.31
		1700	17	9.8	2.2	3.56
		Station 168				
10-17	1602	0930	19	7.8	6.0	10.4
		1038	17	7.8	4.3	7.4
		1155	19	8.0	4.3	7.8
		1315	19	8.0	4.4	8.7
		-	-	-	4.2	7.9
		Station 162				
10-18	0426	0730	16	3.7	1.9	4.24
		0815	17	3.5	1.6	3.01
		0900	17	3.3	1.2	2.69
		-	17	3.2	1.6	2.84
		-	17	3.2	1.3	2.64
		Station 162				
10-21	0752	0955	17	4.8	1.71	2.83
		1045	17	4.7	1.66	2.70
		1145	18	4.5	1.68	2.92
		1240	18	4.3	2.37	3.61
		-	18	4.3	1.40	2.37
		Station 157				
10-15	1314	1535	20	3.6	1.0	2.1
		1620	20	-	2.0	3.1
		1708	20	3.9	2.0	3.2
		1845	20	3.3	1.6	2.7

1969

JAMES RIVER SURVEY

VARIATION OF DO & BOD DURING ½ TIDAL CYCLE

DATE	TIME OF LOW WATER SLACK	TIME OF SAMPLE	TEMP °C	DO mg/l	BOD_2 mg/l	BOD_5 mg/l
		Station 155				
10-20	0642	0745	18	2.5	1.5	2.68
		0845	18	2.5	1.1	2.30
		0942	19	3.1	1.9	2.95
		1043	20	3.0	1.4	2.45
		1141	20	3.1	1.7	2.81
		Station 150				
10-16	1405	1520	21	3.6	1.3	2.6
		1620	21	3.4	1.9	3.4
		1720	21	3.0	1.6	3.0
		1820	21	3.6	1.4	3.1
		1920	20	3.6	1.5	3.4
		Station 106				
10-27	1100	1230	16	6.1	3.02	6.47
		1330	15	6.3	2.75	5.85
		1440	15	6.8	3.09	6.14
		1525	15	7.1	2.38	4.64
		1615	15	7.1	2.24	4.45

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JAMES RIVER SURVEY

LONG TERM BOD
(mg/l)

	STATION			
DAY	175	157	150	126
1	4.62	0.83	0.54	0.62
2	7.70	1.35	0.96	1.26
3	11.4	1.83	1.54	2.35
4	12.8	2.21	1.90	3.10
5	13.8	2.55	2.08	3.85
7	15.4	3.01	2.81	4.81
9	16.8	3.55	4.37	5.30
11	17.8	3.95	5.94	5.79
13	20.8	4.31	6.57	5.95
15	24.8	4.91	6.77	6.37
17	25.7	5.87	7.02	6.50

JAMES RIVER SURVEY
RICHMOND TO HOPEWELL

BACTERIOLOGICAL

DATE	TEMPERATURE (°C)	TOTAL COLIFORM (MF)	FECAL COLIFORM (MF)
	STATION BOULEVARD BRIDGE		
October			
16	18	5,200	1,100
18	23	450	32
20	15	2,800	220
	STATION 200		
October			
15	17	700	90
16	20	370	68
17	19	440	56
18	15	890	110
19	16	730	83
20	16	860	76
21	16	3,500	94
22	17	2,500	80
23	15	1,100	88
24	11	940	350
	STATION 175		
October			
15	18	10,000	-1,000
16	20	2,300	68
17	18	49,000	140
18	16	-10	-1
19	17	10	-1
20	16	-10	-1
21	17	-10	-1
22	17	-10	-1
23	15	-10	-1
24	12	-2	-1
	STATION 168		
October			
15	19	210,000	8,000
16	19	5,200	30
17	18	1,200,000	83,000
18	16	560,000	60,000
19	18	560,000	26,000
20	16	130,000	11,000
21	18	100,000	2,800
22	18	610,000	36,000
23	16	70,000	70
24	13	210,000	40

NOTE: Minus sign indicates less than.

JAMES RIVER SURVEY
RICHMOND TO HOPEWELL

BACTERIOLOGICAL

DATE	TEMPERATURE (°C)	TOTAL COLIFORM (MF)	FECAL COLIFORM (MF)
		STATION 166	
October			
15	19	1,100,000	56,000
16	19	780,000	24,000
17	18	4,200,000	74,000
18	16	3,800,000	49,000
19	18	3,000,000	21,000
20	16	740,000	12,000
21	17	510,000	8,800
22	17	2,000,000	30,000
23	16	4,700,000	42,000
24	15	3,600,000	22,000
		STATION 162	
October			
15	20	245,000	11,050
16	21	430,000	42,000
17	19	320,000	12,000
18	16	250,000	8,600
19	18	290,000	7,500
20	17	530,000	6,100
21	17	250,000	5,000
22	17	240,000	4,600
23	15	290,000	4,800
24	15	1,400,000	32,000
		STATION 157	
October			
15	19	84,000	4,600
16	20	55,000	4,100
17	20	57,000	4,400
18	18	92,000	3,800
19	18	35,000	2,000
20	18	120,000	3,100
21	18	100,000	3,300
22	17	44,000	2,000
23	15	41,000	2,000
24	16	76,000	3,300

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JAMES RIVER SURVEY
RICHMOND TO HOPEWELL

BACTERIOLOGICAL

DATE	TEMPERATURE (°C)	TOTAL COLIFORM (MF)	FECAL COLIFORM (MF)
		STATION 155	
October			
14	22	39,000	2,900
18	19	35,000	2,500
19	20	22,000	760
20	18	72,000	1,700
21	19	48,000	1,500
22	18	30,000	1,200
23	17	12,000	620
24	16	45,000	2,200
		STATION 150	
October			
15	21	110,000	4,700
16	21	43,000	1,600
17	21	25,000	840
18	20	21,000	920
19	19	5,500	290
20	20	11,000	480
21	21	13,000	630
22	19	9,200	440
23	18	6,100	390
24	17	6,200	310
		STATION 135	
October			
15	21	22,000	1,000
16	20	11,000	1,100
17	20	9,300	620
18	19	7,000	260
19	19	1,500	130
20	19	3,200	200
21	20	4,000	210
22	19	3,300	170
23	18	1,100	210
24	16	1,400	130

JAMES RIVER SURVEY
RICHMOND TO HOPEWELL

BACTERIOLOGICAL

DATE	TEMPERATURE (°C)	TOTAL COLIFORM (MF)	FECAL COLIFORM (MF)
		STATION 126	
October			
15	21	4,000	200
16	20	6,000	780
17	20	7,300	660
18	19	3,100	290
19	19	600	180
20	18	2,400	150
21	20	1,100	78
22	18	2,400	310
23	17	670	90
24	16	1,400	230

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JAMES RIVER SURVEY
RICHMOND TO HOPEWELL

BACTERIOLOGICAL

DATE	TEMPERATURE (°C)	TOTAL COLIFORM (MF)	FECAL COLIFORM (MF)
		GILLIE CREEK	
October			
20	17	510,000	34,000
		ALMOND CREEK	
19	17	6,000	-100
		GOODE CREEK	
18	16	630,000	12,000
23	14	47,000,000	1,100,000
		FALLING CREEK	
15	19	720,000	18,000
16	19	-100	-10
17	18	9,800	170
21	17	280,000	6,600
22	17	-10	-10
24	14	2,300,000	47,000

NOTE: Minus sign indicates less than.

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JAMES RIVER SURVEY

HEAVY METALS

DATE	Cu (mg/l)	Cd (mg/l)	Ni (mg/l)	Zn (mg/l)	Pb (mg/l)	Cr (mg/l)
			Station 175			
October						
19	0.01	-0.01	-0.1	0.02	0.02	0.01
23	0.02	-0.01	-0.1	0.02	0.03	0.01
			Station 168			
October						
17	-0.01	-0.01	-0.1	0.02	0.02	-0.01
			Station 162			
October						
18	-0.01	-0.01	-0.1	0.02	0.02	0.01
21	-0.01	-0.01	-0.1	0.02	0.04	-0.01
			Station 155			
October						
20	-0.01	-0.01	-0.1	0.02	0.06	-0.01
			Station 150			
October						
16	-0.01	-0.01	-0.1	0.02	0.07	-0.01
			Station 106			
October						
27	-0.01	-0.01	-0.1	0.02	0.06	-0.01
			Station 800			
October						
27	-0.01	-0.01	-0.1	-0.01	0.04	-0.01
28	-0.01	-0.01	-0.1	-0.01	0.04	-0.01
			Station 700			
October						
27	-0.01	-0.01	-0.1	0.01	0.05	-0.01
28	-0.01	-0.01	-0.1	-0.01	0.09	-0.01

NOTE: Minus sign indicates less than.

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JAMES RIVER SURVEY

HEAVY METALS

DATE	Cu (mg/l)	Cd (mg/l)	Ni (mg/l)	Zn (mg/l)	Pb (mg/l)	Cr (mg/l)
			Station 600			
October						
27	-0.01	-0.01	-0.1	0.01	0.06	-0.01
28	-0.01	-0.01	-0.1	0.01	0.05	-0.01
			Station 500			
October						
27	-0.01	-0.01	-0.1	0.01	0.05	-0.01
28	-0.01	-0.01	-0.1	0.02	0.07	-0.01
			Station 400			
October						
27	-0.01	-0.01	-0.1	0.02	0.07	-0.01
28	-0.01	-0.01	-0.1	0.01	0.07	-0.01

NOTE: Minus sign indicates less than.

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JAMES RIVER SURVEY

NUTRIENTS

DATE	NH_3-N mg/l	NO_3-N mg/l	ORG - N mg/l	TOTAL P mg/l	SOLUBLE P mg/l
			Boulevard Bridge		
10-16	0.02	1.0	0.9	0.05	0.03
18	0.12	1.0	0.9	0.06	0.03
20	0.04	0.8	0.6	0.04	0.02
			Station 200		
10-15	0.03	0.9	0.5	0.05	0.02
16	0.04	0.9	0.9	0.09	0.02
17	0.04	1.0	0.7	0.06	0.02
18	0.04	0.9	0.6	0.07	0.02
19	0.02	1.1	0.6	0.03	0.02
20	0.04	0.9	0.6	0.04	0.01
21	0.03	0.8	0.6	0.04	0.02
22	0.02	0.7	0.6	0.03	-0.01
23	0.03	0.7	0.6	0.04	0.01
24	0.02	0.7	0.3	0.01	-0.01
30	0.05	1.0	0.7	0.04	0.01
			Station 175		
10-15	0.30	0.9	0.8	0.16	0.10
16	0.70	0.9	1.5	0.32	0.23
17	1.8	0.9	1.4	0.47	0.37
18	0.43	1.0	0.9	0.28	0.21
19	0.21	1.0	0.7	0.13	0.10
20	0.44	0.9	0.7	0.22	0.13
21	0.21	0.9	0.7	0.13	0.09
22	0.67	0.8	0.8	0.36	0.27
23	0.19	0.6	0.6	0.11	0.06
24	0.36	0.8	0.5	0.19	0.12
30	0.66	1.0	0.9	0.30	0.21

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JAMES RIVER SURVEY

NUTRIENTS

DATE	NH_3-N mg/l	NO_3-N mg/l	ORG - N mg/l	TOTAL P mg/l	SOLUBLE P mg/l
			Station 168		
10-15	0.42	0.8	0.7	0.27	0.15
16	0.52	0.8	0.6	0.26	0.19
17	0.61	0.9	0.9	0.34	0.23
18	0.56	0.9	1.0	0.39	0.27
19	0.55	1.0	0.9	0.34	0.26
20	0.58	0.9	0.8	0.32	0.23
21	0.60	0.8	0.8	0.39	0.28
22	1.0	0.8	1.1	0.53	0.33
23	0.97	0.8	1.1	0.59	0.47
24	0.61	0.7	0.6	0.38	0.29
30	0.71	0.9	0.9	0.40	0.34
			Station 166		
10-15	0.51	0.7	0.8	0.23	0.12
16	0.52	0.8	0.9	0.27	0.14
17	0.69	0.8	1.0	0.34	0.11
18	0.51	0.9	1.0	0.32	0.17
19	0.48	0.8	1.0	0.31	0.13
20	0.52	1.0	0.8	0.33	0.18
21	0.50	0.9	0.9	0.24	0.13
22	0.65	0.8	0.8	0.34	0.19
23	0.70	0.7	0.9	0.38	0.22
24	0.53	0.8	0.9	0.33	0.18
30	0.60	0.9	0.9	0.36	0.22
			Station 162		
10-15	0.53	0.7	0.8	0.22	0.15
16	0.69	0.8	0.8	0.23	0.15
17	0.67	0.8	0.6	0.32	0.21
18	0.61	0.7	0.9	0.31	0.17
19	0.68	0.8	0.9	0.29	0.17
20	0.65	1.0	1.0	0.32	0.19
21	0.67	1.0	1.0	0.35	0.21
22	0.63	0.9	1.1	0.30	0.16
23	0.80	0.7	0.9	0.32	0.21
24	0.72	0.8	1.1	0.35	0.20
30	0.70	0.8	1.0	0.41	0.24

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JAMES RIVER SURVEY

NUTRIENTS

DATE	NH_3-N mg/l	NO_3-N mg/l	ORG - N mg/l	TOTAL P mg/l	SOLUBLE P mg/l
			Station 157		
10-15	0.52	0.7	0.8	0.19	0.12
16	0.57	0.7	0.7	0.21	0.14
17	0.67	0.7	0.6	0.23	0.15
18	0.72	0.8	0.8	0.28	0.17
19	0.70	0.8	0.7	0.29	0.16
20	0.74	0.9	1.0	0.28	0.16
21	0.79	0.9	0.8	0.31	0.19
22	0.76	0.9	0.9	0.29	0.16
23	0.77	0.9	0.9	0.26	0.13
24	9.77	0.7	0.8	0.31	0.20
30	0.90	0.7	0.9	0.31	0.20
			Station 155		
10-17	0.63	0.7	0.7	0.22	0.16
18	0.67	0.7	0.7	0.24	0.15
19	0.69	0.7	1.0	0.24	0.12
20	0.72	0.8	0.8	0.24	0.15
21	0.76	0.8	0.9	0.26	0.13
22	0.80	0.8	0.9	0.26	0.15
23	0.77	0.9	0.8	0.26	0.14
24	0.76	0.8	0.8	0.28	0.16
30	0.91	0.7	0.8	0.30	0.19
			Station 150		
10-15	0.54	0.5	0.9	0.17	0.07
16	0.50	0.5	0.6	0.17	0.07
17	0.60	0.6	0.9	0.17	0.10
18	0.54	0.6	0.8	0.21	0.10
19	0.56	0.7	0.8	0.17	0.08
20	0.75	0.7	0.9	0.20	0.07
21	0.71	0.7	0.9	0.24	0.08
22	0.74	0.8	0.9	0.23	0.10
23	0.74	0.8	0.8	0.20	0.09
24	0.72	1.0	0.8	0.24	0.09

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JAMES RIVER SURVEY

NUTRIENTS

DATE	NH_3-N mg/l	NO_3-N mg/l	ORG - N mg/l	TOTAL P mg/l	SOLUBLE P mg/l
			Station 135		
10-15	0.53	0.8	0.8	0.13	0.06
16	0.48	0.7	0.8	0.15	0.04
17	0.63	0.7	1.1	0.20	0.05
18	0.47	0.7	0.7	0.17	0.05
19	0.46	0.8	0.9	0.17	0.05
20	0.56	0.7	0.8	0.18	0.05
21	0.62	0.8	1.0	0.20	0.05
22	0.55	0.8	0.9	0.20	0.05
23	0.50	0.8	0.9	0.18	0.05
24	0.58	0.8	0.8	0.21	0.05
			Station 126		
10-15	0.55	0.9	1.0	0.14	0.05
16	0.30	0.8	0.9	0.14	0.03
17	0.47	0.7	1.1	0.15	0.05
18	0.40	0.7	0.8	0.18	0.05
19	0.43	0.9	1.0	0.22	0.03
20	0.41	0.7	0.9	0.18	0.05
21	0.50	0.8	0.9	0.18	0.05
22	0.45	0.8	1.0	0.19	0.04
23	0.45	0.8	1.0	0.21	0.04
24	0.48	0.9	1.0	0.22	0.04
			Station 106		
10-27	0.62	1.2	0.9	0.17	0.02
28	0.82	1.3	1.0	0.22	0.02
29	0.86	1.4	1.1	0.18	0.02
30	0.71	1.3	1.0	0.16	0.02
			Station 94		
10-27	0.47	1.6	1.1	0.19	0.01
28	0.41	1.4	1.0	0.23	0.01
29	0.44	1.4	0.9	0.16	0.02
30	0.46	1.5	1.1	0.17	0.02

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JAMES RIVER SURVEY

NUTRIENTS

DATE	NH_3-N mg/l	NO_3-N mg/l	ORG - N mg/l	TOTAL P mg/l	SOLUBLE P mg/l
			Station 86		
10-27	0.23	1.3	0.8	0.11	0.01
28	0.20	1.4	0.8	0.15	-0.01
29	0.29	1.5	0.8	0.14	0.01
30	0.23	1.5	1.0	0.16	0.03
			Station 76		
10-27	0.11	1.4	0.7	0.10	0.01
28	0.13	1.5	0.7	0.15	0.02
29	0.15	1.6	0.7	0.12	0.02
30	0.12	1.4	0.9	0.13	0.03
			Sturgeon Point		
10-27	0.10	1.6	0.6	0.10	0.02
28	0.10	1.5	0.7	0.11	0.01
29	0.12	1.5	0.6	0.12	0.02
30	0.10	1.4	0.8	0.13	0.02
			Station 74		
10-27	0.08	1.6	0.5	0.08	0.02
28	0.06	1.4	0.8	0.15	0.01
29	0.07	1.4	0.6	0.16	0.05
30	0.06	1.4	0.7	0.11	0.02
			Gillie Creek		
10-20	4.2	0.9	1.2	1.4	0.40
			Almond Creek		
10-19	0.62	1.0	1.0	0.51	0.34
			Goode Creek		
10-18	0.95	0.5	3.8	1.3	0.19
23	7.6	0.1	5.7	4.2	2.2

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JAMES RIVER SURVEY

NUTRIENTS

DATE	NH_3-N mg/l	NO_3-N mg/l	ORG - N mg/l	TOTAL P mg/l	SOLUBLE P mg/l
			Falling Creek		
10-15	0.63	0.8	0.8	0.32	0.21
16	4.0	0.4	2.3	1.3	0.92
17	6.8	0.5	2.5	2.7	1.6
21	0.87	1.2	1.7	0.71	0.24
22	5.8	0.4	3.6	2.6	2.0
24	0.95	0.8	1.5	0.90	0.15
			Station 800		
10-27	0.16	0.2	0.7	0.03	-0.01
28	0.13	0.2	0.6	0.03	-0.01
			Station 700		
10-27	0.45	0.2	0.7	0.17	0.09
28	0.57	0.2	0.9	0.29	0.22
			Station 600		
10-27	0.56	0.3	1.1	0.33	0.17
28	0.59	0.3	1.1	0.33	0.14
			Station 500		
10-27	0.31	0.4	1.2	0.27	0.06
28	0.40	0.4	1.2	0.26	0.07
			Station 400		
10-27	0.30	0.6	1.0	0.22	0.03
28	0.52	0.8	1.0	0.25	0.04

1969

JAMES RIVER SURVEY

VARIATION OF NUTRIENT CONCENTRATIONS

DURING ½ TIDAL CYCLE

DATE	TIME OF LOW WATER SLACK	TIME OF SAMPLE	NH_3-N mg/l	NO_3-N mg/l	ORG-N mg/l	TOTAL P mg/l	SOLUBLE P mg/l
			Station 175				
10-23	1019	1125	0.29	0.7	0.7	0.15	0.09
		1215	0.25	0.7	0.7	0.14	0.09
		1315	0.98	0.7	1.0	0.35	0.26
		1405	1.3	0.6	1.1	0.39	0.29
		1455	1.4	0.7	1.8	0.49	0.34
			Station 175				
10-19	1901	1255	1.6	1.0	1.1	0.51	0.37
		1400	1.4	1.1	1.0	0.38	0.29
		1500	0.71	1.0	1.2	0.28	0.21
		1600	1.0	1.1	1.1	0.45	0.33
		1700	0.46	1.1	0.9	0.24	0.17
			Station 168				
10-17	1602	0930	0.55	0.8	0.7	0.35	0.22
		1038	0.55	0.8	1.4	0.34	0.22
		1155	0.57	0.9	0.9	0.34	0.22
		1315	0.42	0.9	1.2	0.26	0.18
		1425	0.74	0.9	1.0	0.42	0.30
			Station 162				
10-18	0426	0730	0.63	0.8	1.1	0.31	0.17
		0815	0.64	0.8	0.9	0.31	0.18
		0900	0.66	0.8	0.8	0.31	0.18
		-	0.72	0.8	0.9	0.31	0.19
		-	0.67	0.8	1.2	0.30	0.19
			Station 162				
10-21	0752	0955	0.64	1.0	1.0	0.35	0.20
		1045	0.72	0.9	0.9	0.31	0.19
		1145	0.68	0.9	0.9	0.32	0.19
		1240	0.67	0.9	0.9	0.33	0.20
		-	0.64	0.9	0.9	0.30	0.18

1969

JAMES RIVER SURVEY

VARIATION OF NUTRIENT CONCENTRATIONS

DURING ½ TIDAL CYCLE

DATE	TIME OF LOW WATER SLACK	TIME OF SAMPLE	NH_3-N mg/l	NO_3-N mg/l	ORG-N mg/l	TOTAL P mg/l	SOLUBLE P mg/l
			Station 157				
10-15	1314	1535	0.51	0.7	0.7	0.17	0.11
		1620	0.63	0.6	0.8	0.20	0.12
		1708	0.02	1.1	0.7	0.17	0.12
		1845	0.55	0.7	0.8	0.21	0.12
			Station 155				
10-20	0642	0745	0.74	0.8	0.7	0.24	0.14
		0845	0.73	0.8	0.7	0.24	0.14
		0942	0.73	0.8	0.9	0.22	0.12
		1043	0.74	0.8	1.2	0.23	0.11
		1141	0.72	0.8	0.7	0.22	0.11
			Station 150				
10-16	1405	1520	0.51	0.6	0.6	0.21	0.08
		1620	0.50	0.6	0.7	0.16	0.07
		1720	0.54	0.6	0.7	0.16	0.07
		1820	0.51	0.7	0.6	0.18	0.05
		1920	0.52	0.7	0.8	0.15	0.07

1969

JAMES RIVER SURVEY

PHYTOPLANKTON

STATION	DIATOMS	BLUE-GREENS	GREENS	FLAGELLATE GREENS	FLAGELLATE PIGMENTED	TOTAL
		NUMBER PER MILLILITER				
175	57	3,604	2,747	1,772	114	8,294
157	200	4,691	4,292	5,491	29	14,703

1969

JAMES RIVER SURVEY

PHOTOSYNTHETIC OXYGEN PRODUCTION

(Light-Dark Bottle Method)

DATE	DEPTH (ft)	SAMPLING TIME (hrs)	INITIAL D.O. (mg/l)	D.O.-LIGHT (mg/l)	DO-DARK (mg/l)
			Station 175		
10-23	2	24	9.0	9.0	9.0
				8.9	8.8
	5		9.0	8.8	8.9
				9.0	9.0
	10		9.0	9.0	9.0
				8.8	8.9
			Station 157		
10-20	2	24	3.2	3.3	2.5
				3.0	2.4
	5		3.0	2.6	2.4
				2.5	2.5
	10		3.0	2.4	2.4
				2.5	2.4
			Station 155		
10-17	2	6	3.1	4.9	3.8
				4.8	3.7
	5		3.5	3.3	3.1
				3.4	3.1
	10		3.2	3.1	3.0
				3.2	3.3

1969

JAMES RIVER SURVEY

PERCENTAGE OF VOLATILE SOLIDS, CARBON, NITROGEN & PHOSPHORUS

JAMES RIVER MUDS

STATION	VOLATILE SOLIDS %	C %	N %	P %
168	1.11	< 0.1	<0.1	0.04
162	3.63	1.2	0.1	0.06
155	5.25	1.8	0.2	0.15
150	4.46	2.2	0.1	0.11
106	8.29	1.3	0.1	0.074

1969

JAMES RIVER SURVEY

BOTTOM FAUNA

STATION	BENTHIC ORGANISMS/SQUARE FOOT
168	0
167	12 Sludgeworms
155	6 Sludgeworms
150	2 Sludgeworms
106	6 Sludgeworms

1969

JAMES RIVER SURVEY

COD NEAR DUPONT OUTFALL

DATE	COD (mg/l)
10-21	-40
22	42
23	-40
24	83

1969
JAMES RIVER SURVEY
FLOW DATA
DISCHARGE IN SECOND-FEET OF
JAMES RIVER AT LICK RUN

DAY	OCTOBER DISCHARGE	NOVEMBER DISCHARGE	DECEMBER DISCHARGE	JANUARY DISCHARGE	FEBRUARY DISCHARGE
1	344	308	395	18100	2500
2	422	445	381	7390	2440
3	455	578	381	6370	
4	495	530	358	5100	
5	465	485	358	2700	
6	404	441	344	2260	
7	376	409	367	1960	
8	376	395	450	1550	
9	363	386	525	945	
10	353	376	890	945	
11	335	358	7050	1050	
12	335	353	5560	1130	
13	330	344	3460	980	
14	317	344	2500	854	
15	312	340	1960	798	
16	303	340	1600	762	
17	312	335	1210	762	
18	308	326	980	980	
19	308	340	910	1450	
20	303	376	861	1350	
21	303	632	756	1020	
22	299	696	726	750	
23	294	616	726	786	
24	294	566	708	945	
25	290	525	672	882	
26	294	485	622	945	
27	294	455	578	1130	
28	294	436	540	1130	
29	290	422	632	1350	
30	286	409	5200	4200	
31	290		29200	3460	

1969
JAMES RIVER SURVEY
FLOW DATA
DISCHARGE IN SECOND-FEET OF
JAMES RIVER AT HOLCOMB ROCK

DAY	OCTOBER DISCHARGE	NOVEMBER DISCHARGE	DECEMBER DISCHARGE	JANUARY DISCHARGE	FEBRUARY DISCHARGE
1	980	748	1080	32900	6120
2	1860	914	992	16400	6980
3	2520	1330	980	11400	9700
4	2000	1730	632	8760	9940
5	1720	1720	852	6760	
6	1560	1560	992	5700	
7	1450	1420	892	5180	
8	1420	1300	1390	4360	
9	1280	1110	1560	3230	
10	1200	1200	3720	2440	
11	1100	1140	13700	2670	
12	1060	1050	11100	3230	
13	1020	1120	6780	2990	
14	980	958	5180	2670	
15	870	881	4080	2520	
16	903	925	3570	2290	
17	892	980	3070	2200	
18	861	780	2590	3150	
19	834	1040	2520	3820	
20	834	1030	2360	4260	
21	825	1150	2360	3570	
22	780	1140	2200	2750	
23	780	1620	1860	2590	
24	798	1520	2000	2750	
25	670	1450	2000	2910	
26	740	1400	1780	2830	
27	740	1290	1760	2830	
28	764		1590	2910	
29	678	1140	2000	2910	
30	798	1110	20400	4860	
31	748		55600	7630	

1969
JAMES RIVER SURVEY
FLOW DATA
DISCHARGE IN SECOND-FEET OF
JAMES RIVER NEAR RICHMOND, VA.

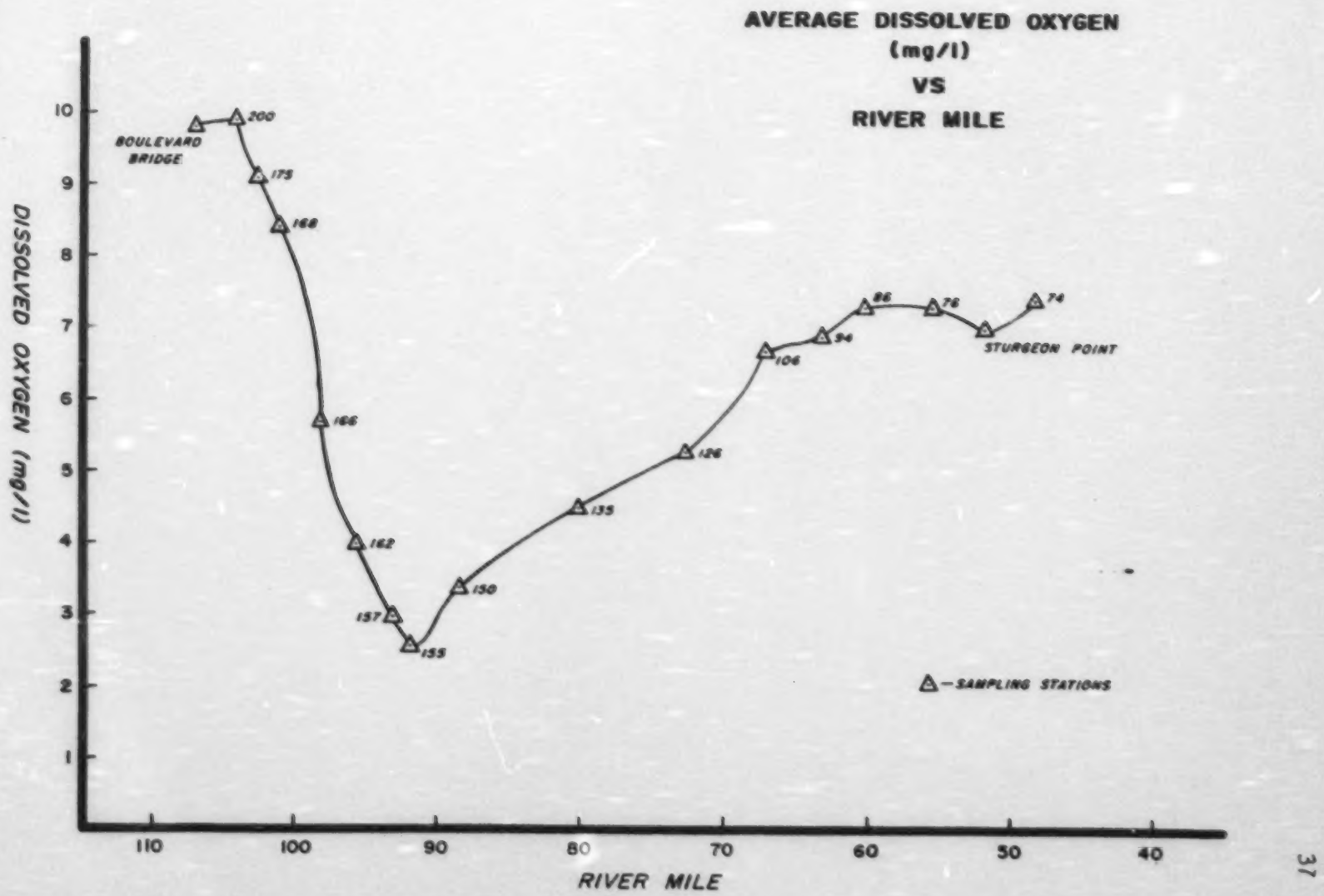
DAY	OCTOBER DISCHARGE	NOVEMBER DISCHARGE	DECEMBER DISCHARGE	JANUARY DISCHARGE
1	1490	910	1650	40100
2	1370	1140	1300	62700
3	1650	1100	1140	46600
4	3940	1050	1460	22100
5	3700	1860	1210	15400
6	3150	1760	1230	11800
7	2450	2140	1230	9510
8	2350	2040	1620	8380
9	2280	1920	2190	7150
10	2090	1790	2980	5700
11	1920	1740	4200	4460
12	1670	1690	9590	4200
13	1580	1560	14300	4840
14	1400	1740	14600	5700
15	1230	1300	9530	5260
16	1440	1460	7320	4980
17	1260	1530	6160	4200
18	990	1030	4840	4080
19	1010	1370	4450	6980
20	1140	1330	3950	8380
21	990	1740	3080	7490
22	1050	2040	3700	6480
23	1050	1810	5260	5760
24	1030	1760	5550	4580
25	950	1670	3950	4980
26	810	1920	3580	5480
27	930	2040	3580	5400
28	890	1790	3450	4980
29	890	1860	3450	4840
30	910	1560	3450	4840
31	1010		8820	5400

1969
JAMES RIVER SURVEY
FLOW DATA
DISCHARGE IN SECOND-FEET OF
JAMES RIVER & KANAWHA CANAL NEAR RICHMOND, VA.

DAY	OCTOBER DISCHARGE	NOVEMBER DISCHARGE	DECEMBER DISCHARGE	JANUARY DISCHARGE
1	775	760	775	852
2	775	760	775	836
3	712	760	775	852
4	354	790	775	884
5	852	790	775	868
6	836	790	775	900
7	820	805	775	884
8	820	790	790	868
9	805	790	805	868
10	805	790	836	836
11	805	790	868	775
12	790	790	940	790
13	790	775	900	805
14	790	790	884	694
15	775	775	868	802
16	775	775	868	781
17	775	775	868	836
18	775	760	852	868
19	775	775	852	900
20	775	775	852	884
21	775	790	836	884
22	760	790	852	884
23	775	790	868	884
24	775	790	852	884
25	760	790	836	884
26	760	790	836	900
27	760	790	836	868
28	760	790	852	884
29	760	790	852	884
30	760	775	852	884
31	760		868	884

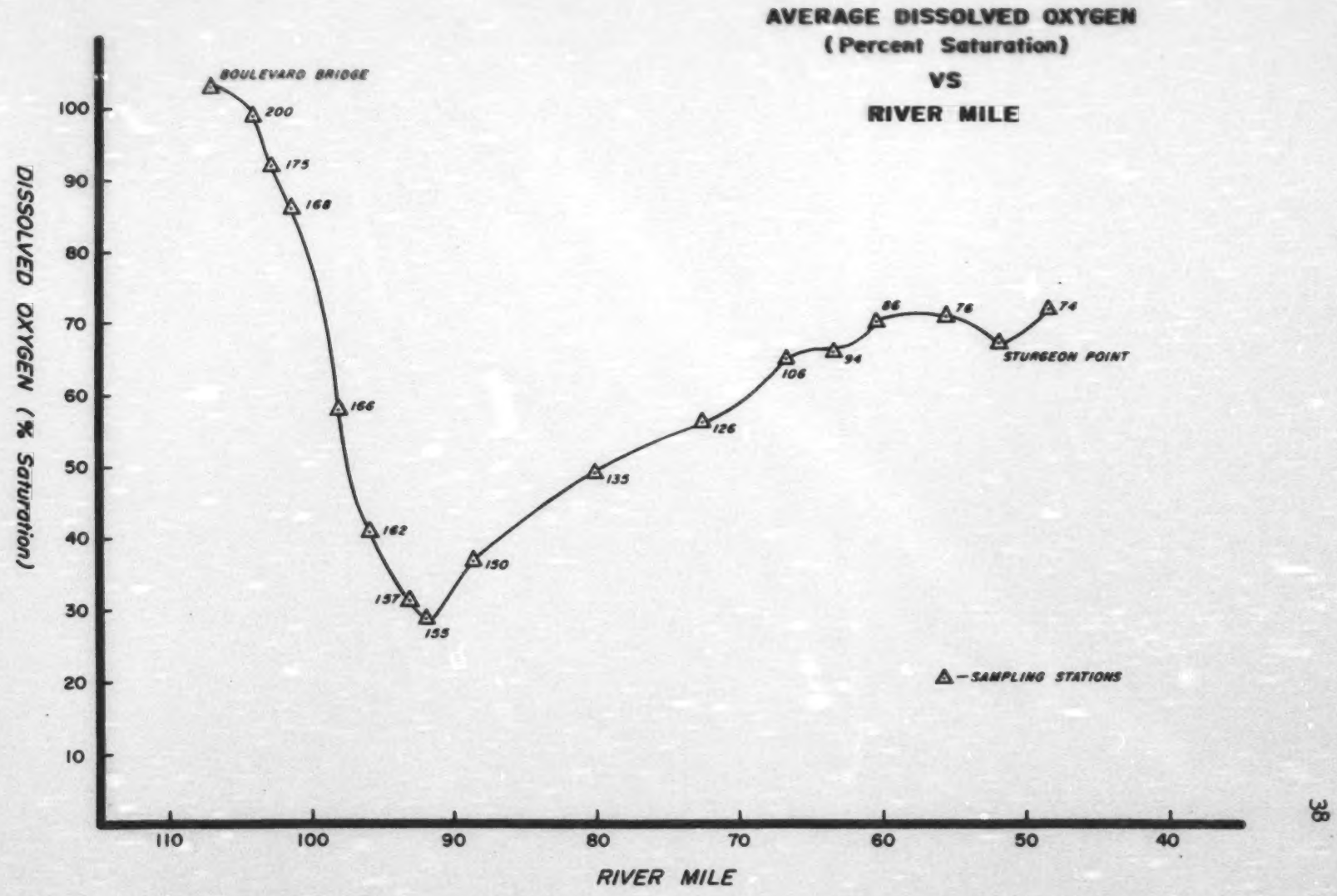
JAMES RIVER STUDY

(1969)



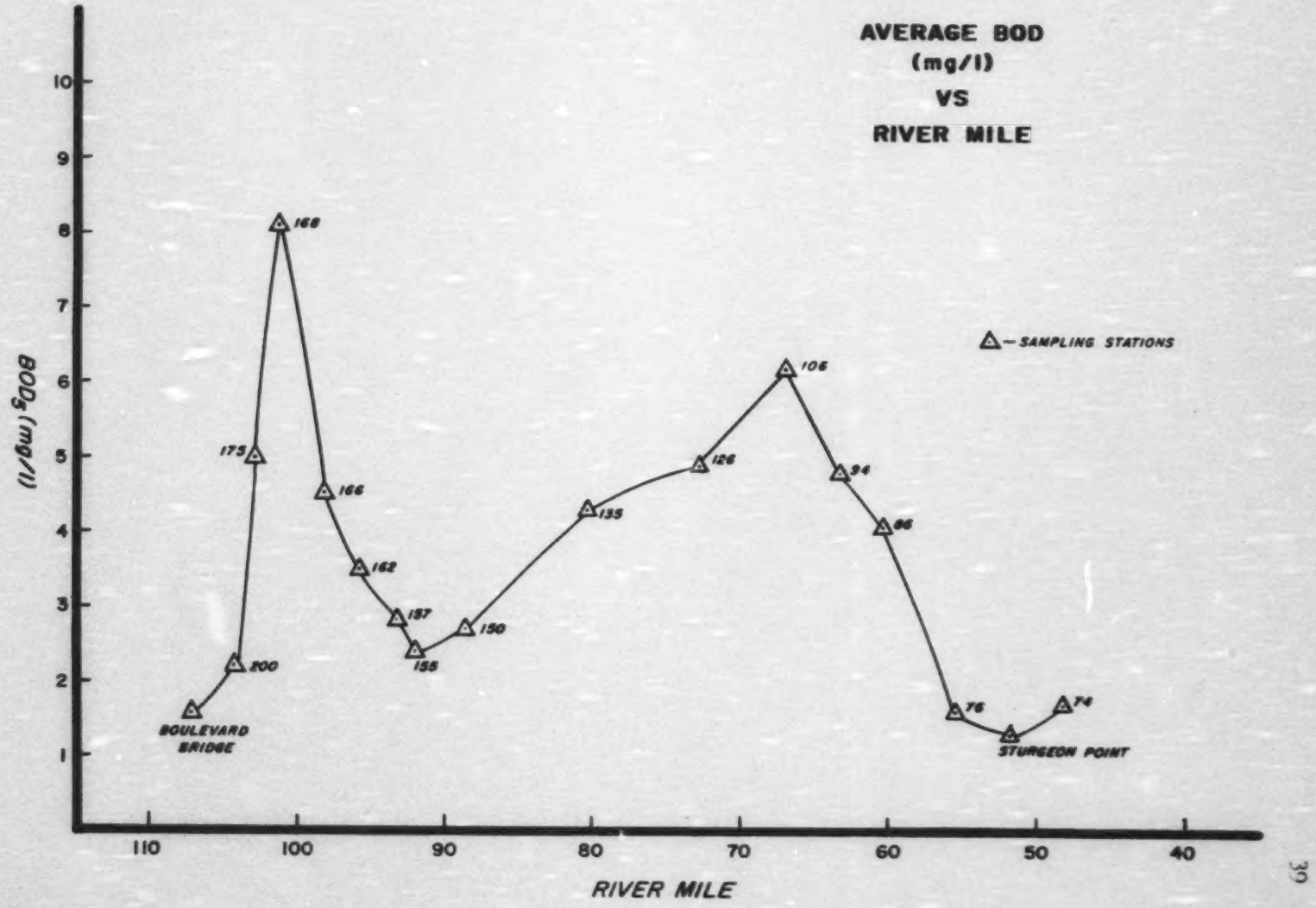
JAMES RIVER STUDY

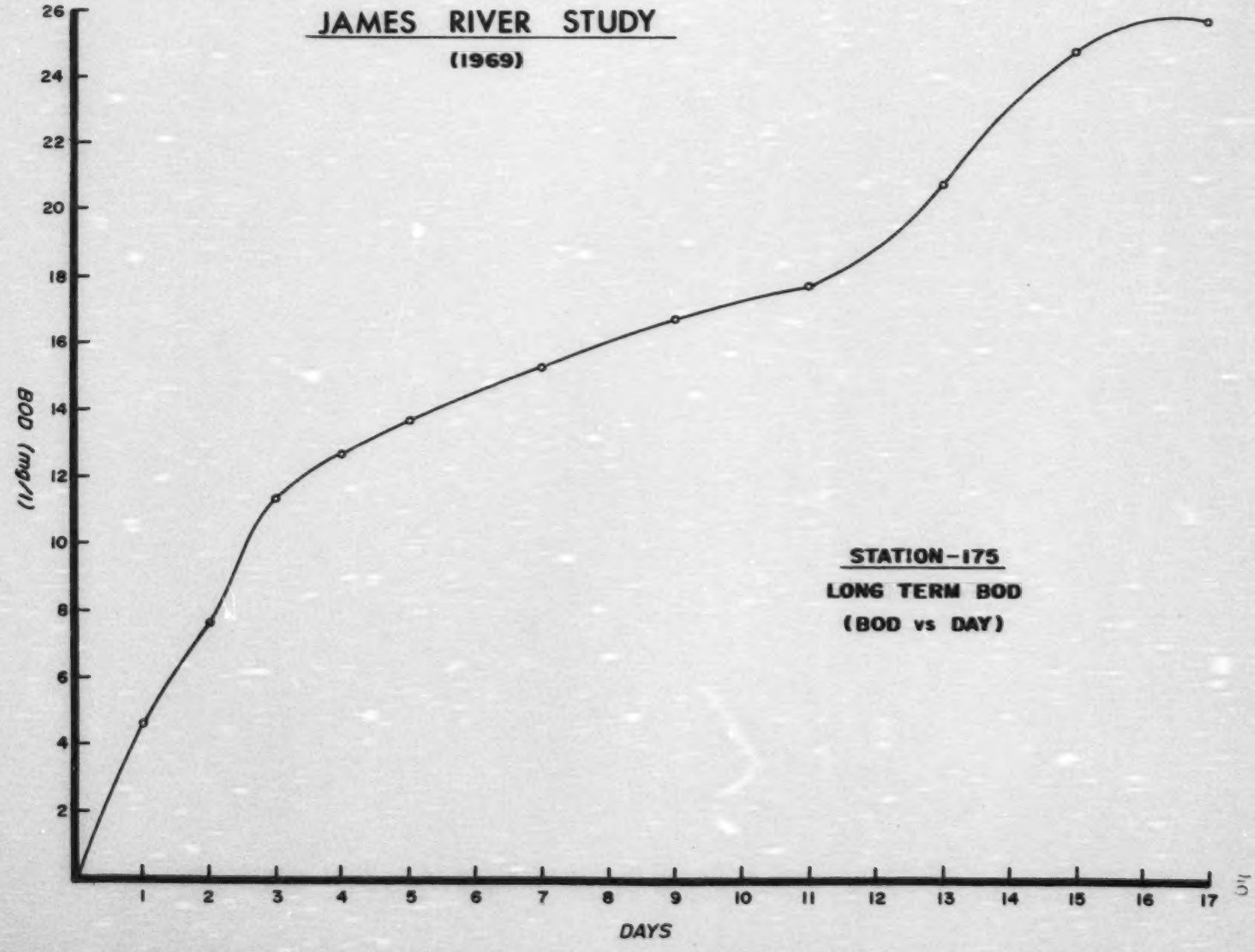
(1969)

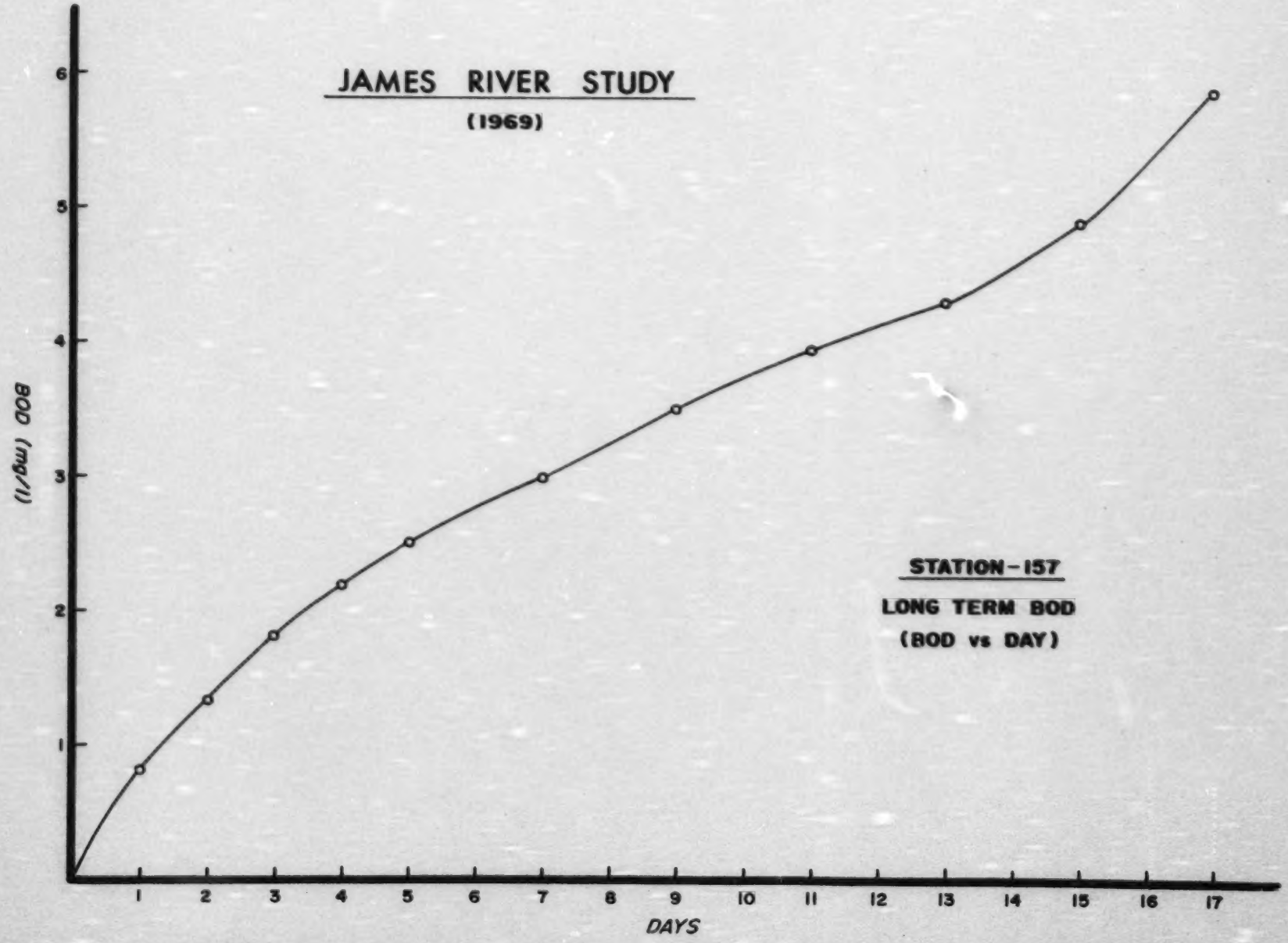


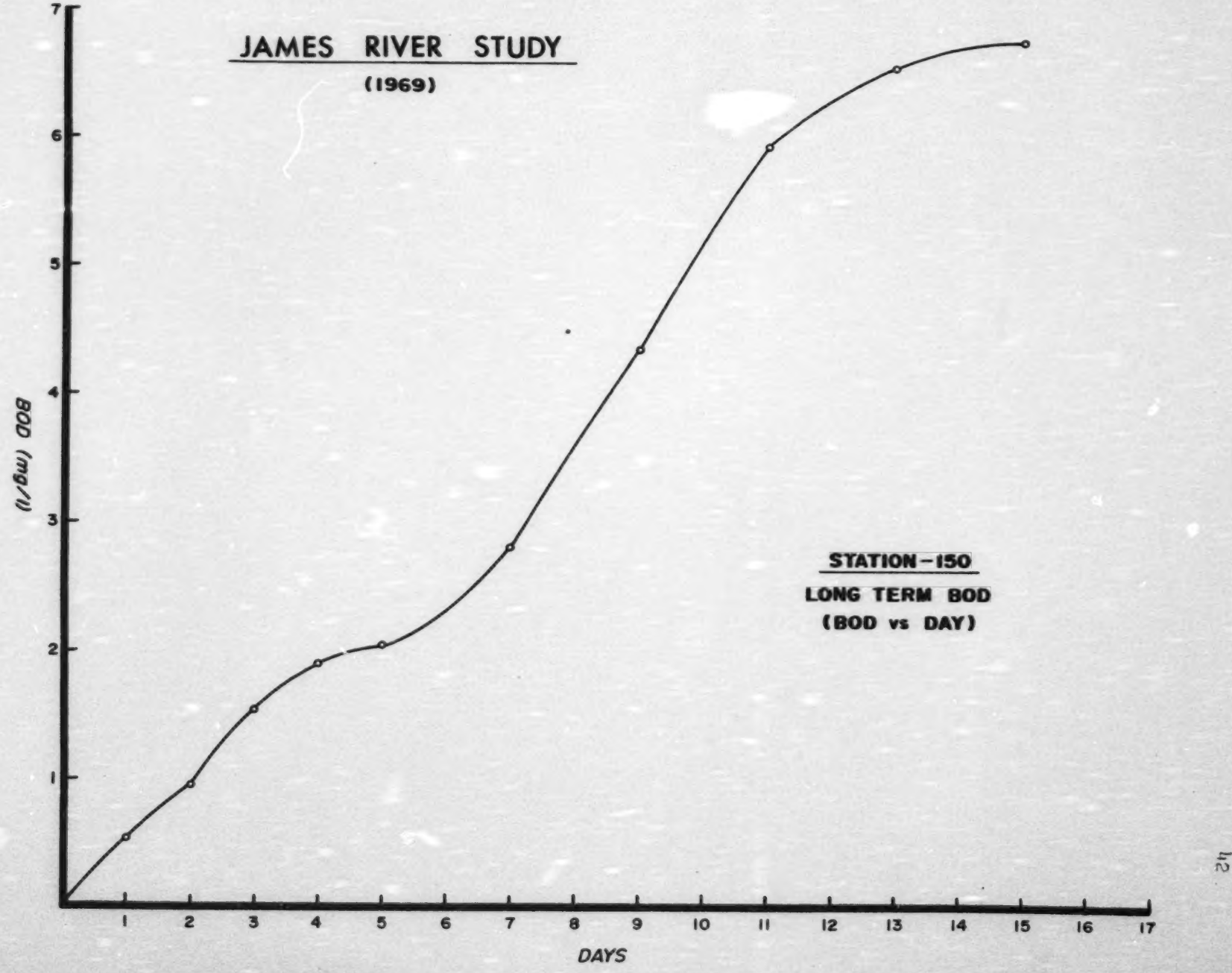
JAMES RIVER STUDY

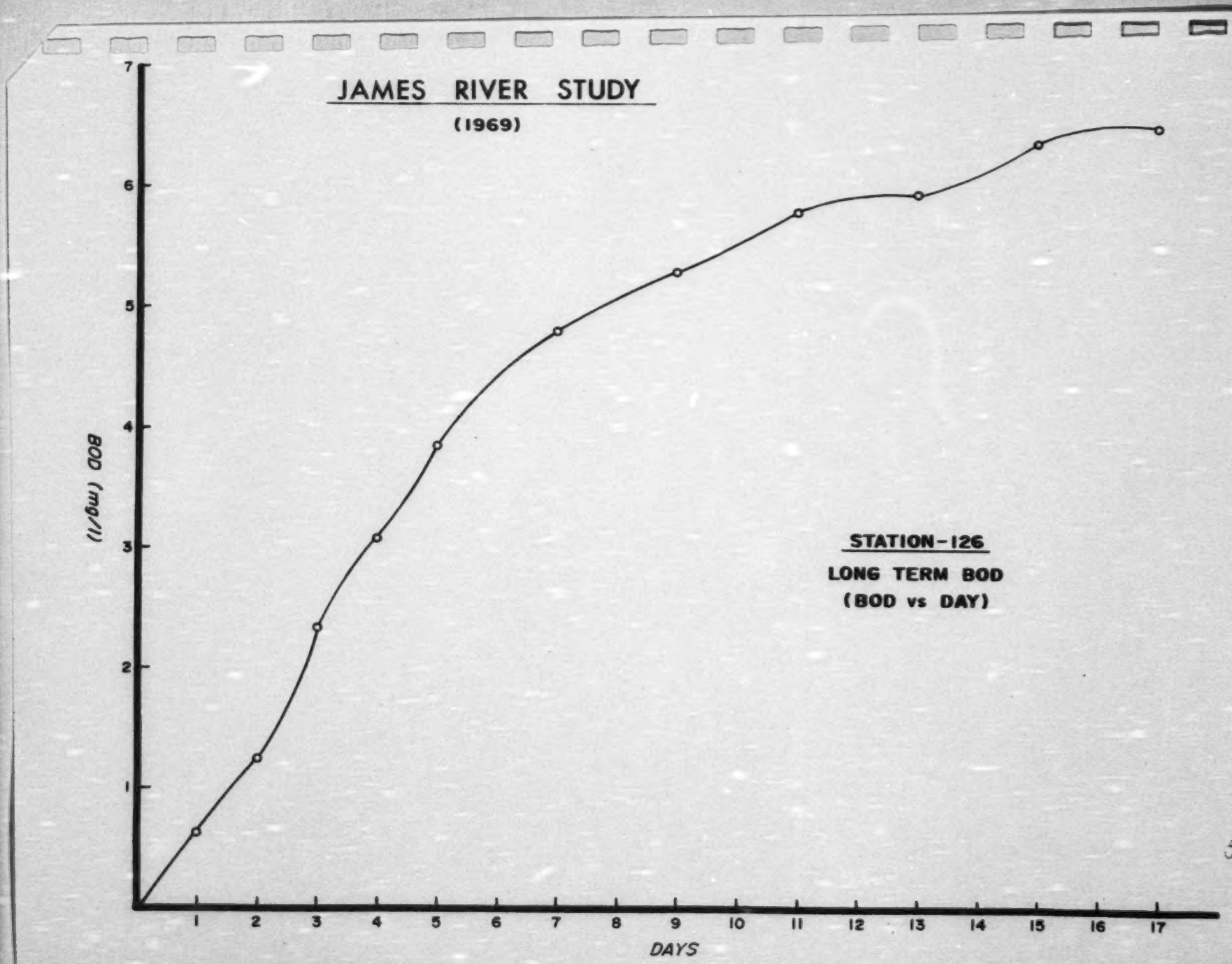
(1969)

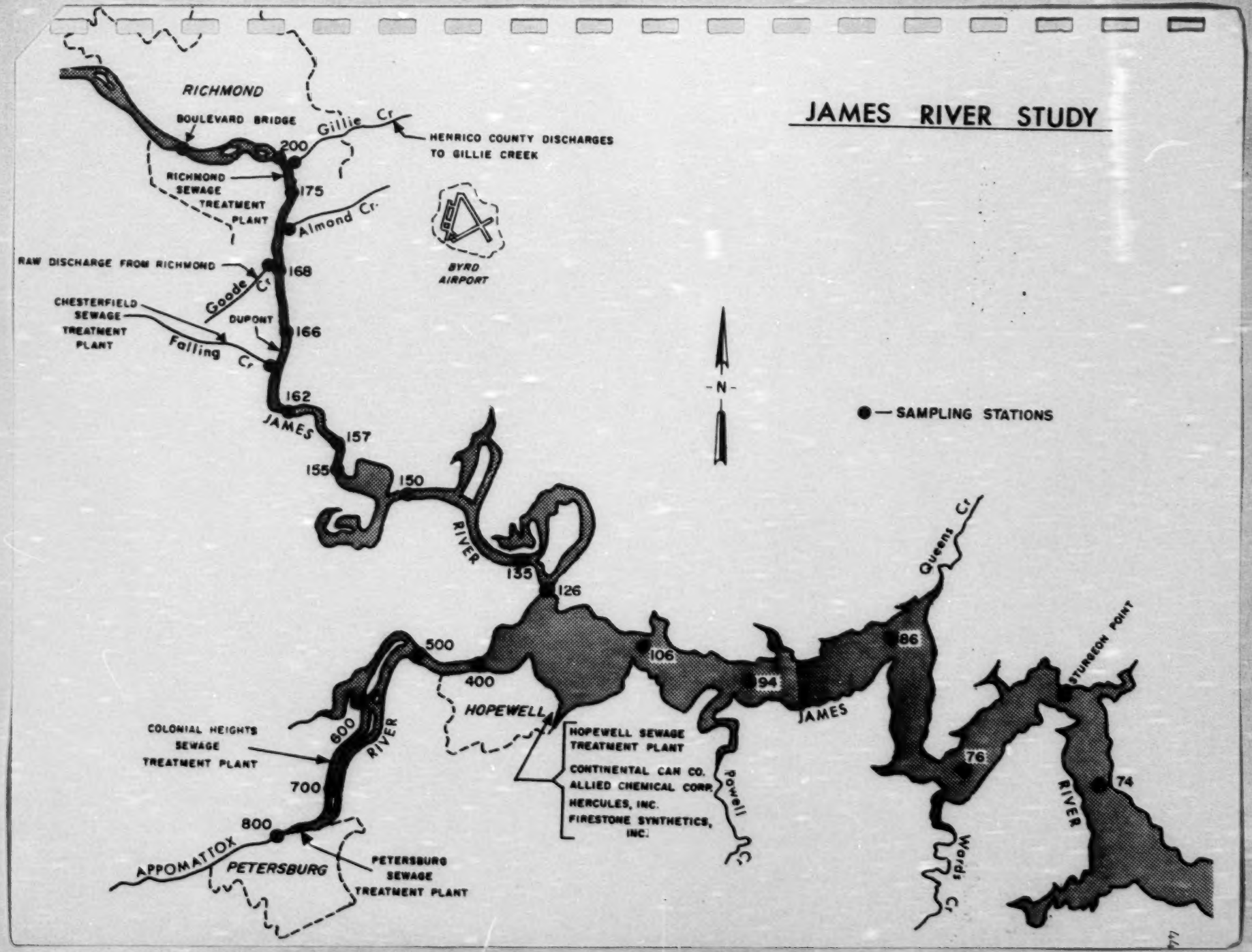



JAMES RIVER STUDY
(1969)
STATION-175
LONG TERM BOD
(BOD vs DAY)
BOD (mg/l)
DAYS
26
24
22
20
18
16
14
12
10
8
6
4
2
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17


JAMES RIVER STUDY
(1969)
STATION - 157
LONG TERM BOD
(BOD vs DAY)
BOD (mg/l)
DAYS
1
2
3
4
5
6
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17


JAMES RIVER STUDY
(1969)
STATION - 150
LONG TERM BOD
(BOD vs DAY)
BOD (mg/l)
DAYS
1
2
3
4
5
6
7
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17


JAMES RIVER STUDY
(1969)
STATION-126
LONG TERM BOD
(BOD vs DAY)
BOD (mg/l)
DAYS
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17


JAMES RIVER STUDY
RICHMOND
BOULEVARD BRIDGE
Gillie Cr.
HENRICO COUNTY DISCHARGES TO GILLIE CREEK
200
RICHMOND SEWAGE TREATMENT PLANT
175
Almond Cr.
BYRD AIRPORT
RAW DISCHARGE FROM RICHMOND
168
Goode Cr.
CHESTERFIELD SEWAGE TREATMENT PLANT
DUPONT
166
Falling Cr.
162
JAMES
157
155
150
RIVER
135
126
N
SAMPLING STATIONS
Queens Cr.
500
106
86
400
94
JAMES
HOPEWELL
STURGEON POINT
HOPEWELL SEWAGE TREATMENT PLANT
CONTINENTAL CAN CO.
ALLIED CHEMICAL CORP.
HERCULES, INC.
FIRESTONE SYNTHETICS, INC.
COLONIAL HEIGHTS SEWAGE TREATMENT PLANT
600
RIVER
Powell Cr.
76
74
RIVER
700
Wards Cr.
800
APPOMATTOX
PETERSBURG
PETERSBURG SEWAGE TREATMENT PLANT